

CLAIMS

What is claimed is:

1. A flashlight, comprising:
a light source;
a housing;
at least two battery locations internal to the housing for the
5 positioning of at least two batteries, each of the battery locations being
capable of accommodating one of the at least two batteries, one of the at
least two batteries being one of at least two distinct sizes; and
an electro-mechanical structure that prevents a closing of an
electrical circuit that electrically couples the at least two batteries to the light
10 source when a first of the at least two batteries and a second of the at least
two batteries are of distinct sizes.
2. The flashlight of claim 1, wherein the electro-mechanical
structure comprises a switch that prevents a closing of an electrical circuit
that electrically couples the at least two batteries to the light source when
the size of a first of the at least two batteries differs from the size of a
5 second of the at least two batteries.
3. The flashlight of claim 2, wherein the electro-mechanical
structure comprises:
at least two first battery contacts associated with a first one of the at
least two battery locations; and
5 at least two second battery contacts associated with a second one of
the at least two battery locations.

4. The flashlight of claim 3, wherein:
a first one of the at least two first battery contacts and a first one of the at least two second battery contacts being positioned to contact a first battery of a first predefined size; and
5 a second one of the at least two first battery contacts and a second one of the at least two second battery contacts being positioned to contact a second battery of a second predefined size.

5. The flashlight of claim 4, wherein the switch further comprises:
a first position that electrically couples the first ones of the at least two first and second battery contacts to the light source; and
a second position that electrically couples the second ones of the at least two first and second battery contacts to the light source.

6. The flashlight of claim 5, further comprising:
a third one of the at least two first battery contacts associated with the first one of the at least two battery locations;
a third one of the at least two second battery contacts associated with
5 the second one of the at least two battery locations;
the third one of the at least two first battery contacts and the third one of the at least two second battery contacts being positioned to contact a third battery of a third predefined size; and
the switch comprises a third position that electrically couples the third
10 ones of the at least two first and second battery contacts to the light source.

7. The flashlight of claim 1, wherein the electro-mechanical structure further comprises a retaining member internal to the housing capable of impinging on the at least two batteries when they are positioned in the at least two battery locations.

8. The flashlight of claim 7, wherein the retaining member comprises a spring that extends between the housing and the at least two battery locations.

9. The flashlight of claim 7, wherein the retaining member comprises a movable arm that pivots about an axis between the housing and the at least two battery locations.

10. The flashlight of claim 1, wherein the electro-mechanical structure comprises a battery tray disposed inside the housing.

11. The flashlight of claim 10, wherein the battery tray can move longitudinally inside the housing and to a position external to the housing.

12. The flashlight of claim 11, wherein the electro-mechanical structure further comprises:

a retaining member internal to the housing capable of impinging on the at least two batteries when they are positioned in the at least two battery
5 locations; and

the retaining member can be moved toward and away from the at least two battery locations when the battery tray is moved longitudinally.

13. The flashlight of claim 3, wherein the at least two first battery contacts associated with the first of the at least two battery locations lie in substantially the same plane.

14. The flashlight of claim 13, wherein the at least two first battery contacts associated with the first of the at least two battery locations are mounted on an insulator receptacle that can move longitudinally inside the housing.

15. The flashlight of claim 3, wherein each of the at least two second battery contacts associated with the second one of the at least two battery locations are spaced apart in two dimensions.

16. The flashlight of claim 15, wherein at least two second battery contacts are each positioned to prevent electrical contact with a battery of a size that differs from a predetermined size associated with each of the at least two second battery contacts, respectively.

17. The flashlight of claim 16, wherein each of the at least two second battery contacts are positioned to prevent contact of a positive terminal of a battery of any size.

18. The flashlight of claim 17, wherein the at least two second battery contacts are mounted on a rear insulator receptacle that has at least two step recesses, and one of the at least two second battery contacts is mounted on each of the at least two step recesses.

19. The flashlight of claim 18, wherein the rear insulator receptacle further comprises a portion of a battery tray inside the housing.

20. The flashlight of claim 16, wherein the switch is a two-pole, three position switch.

21. The flashlight of claim 2, wherein the electro-mechanical device further comprises a battery tray that defines a first battery location, a second battery location and a third battery location.

22. The flashlight of claim 21, wherein the battery tray comprises an insulator receptacle disposed between first and second ones of battery locations.

23. The flashlight of claim 22, wherein the flashlight comprises:
at least two first battery contacts associated with the first battery locations;

5 at least two second battery contacts associated with the second battery locations;

at least two third battery contacts associated with the third battery locations;

10 a first one of the at least two first battery contacts, a first one of the at least two second battery contacts, and a first one of the at least two third battery contacts being positioned to contact a first battery of a first predefined size; and

15 a second one of the at least two first battery contacts, a second one of the at least two second battery contacts, and a second one of the at least two third battery contacts being positioned to contact a second battery of a second predefined size.

24. The flashlight of claim 23, wherein the switch further comprises:

- a first position that electrically couples the first ones of the at least two first and second battery contacts to the light source; and
- 5 a second position that electrically couples the second ones of the at least two first and second battery contacts to the light source.

25. The flashlight of claim 1, wherein the electro-mechanical structure further comprises at least two leaf springs, each of the at least two leaf springs being associated with a respective one of the battery locations.

26. The flashlight of claim 25, wherein an apex of each of the at least two leaf springs projects into one of the battery locations.

27. The flashlight of claim 1, wherein the electro-mechanical structure further comprises a battery contact electrically coupled to the light source.

28. The flashlight of claim 27, wherein the battery contact is mounted on a moveable insulator receptacle.

29. The flashlight of claim 28, wherein the battery contact is coupled to the light source through a conductive spring.

30. The flashlight of claim 25, wherein:
each of the leaf springs further comprises a conductive leaf spring;
one of the conductive leaf springs is coupled to a first battery contact;
and
- 5 a second one of the conductive leaf springs is electrically coupled to the light source.

31. The flashlight of claim 30, wherein the second one of the conductive leaf springs is electrically coupled to the light source through a switch.

32. The flashlight of claim 25, wherein each of the leaf springs further comprises a conductive leaf spring, and the electromechanical structure further comprises at least two bridge conductors, each of the bridge conductors having a pair of bridge contacts, wherein one of the
5 bridge conductors electrically couples a first one of the conductive leaf springs with a second one of the conductive leaf springs when an apex of each of the conductive leaf springs is displaced by one of a number of predefined distances.

33. The flashlight of claim 32, wherein each of the predefined distances is associated with the size of a respective one of the at least two batteries.

34. The flashlight of claim 25, wherein each of the at least two conductive leaf springs further comprises a pair of end contacts, wherein a compression of an apex of each conductive leaf spring causes a displacement of one of the end contacts in the common plane with respect
5 to the other of the end contacts.

35. A flashlight, comprising:
a light source;
a housing;

at least two battery locations internal to the housing for the positioning
5 of at least two batteries, each of the battery locations being capable of
accommodating one of the at least two batteries of at least two
predetermined sizes;
at least two first battery contacts associated with a first one of the at
least two battery locations; and
10 at least two second battery contacts associated with a second one of
the at least two battery locations; and
a switch that prevents a closing of an electrical circuit that electrically
couples the at least two batteries to the light source when a first of the at
least two batteries and a second of the at least two batteries are of distinct
15 sizes.

36. The flashlight of claim 35, wherein:
a first one of the at least two first battery contacts and a first one of
the at least two second battery contacts being positioned to contact a first
battery of a first predefined size; and
5 a second one of the at least two first battery contacts and a second
one of the at least two second battery contacts being positioned to contact a
second battery of a second predefined size; and
wherein the switch further comprises:
a first position that electrically couples the first ones of the at least
10 two first and second battery contacts to the light source; and
a second position that electrically couples the second ones of the at
least two first and second battery contacts to the light source.

37. The flashlight of claim 36, wherein each of the at least two
second battery contacts associated with the second one of the at least two
battery locations are spaced apart in two dimensions.

38. The flashlight of claim 37, wherein the flashlight further comprises:

5 a retaining member internal to the housing capable of impinging on the at least two batteries when they are positioned in the at least two battery locations.

39. The flashlight of claim 38, wherein the flashlight further comprises:

5 a battery tray disposed inside the housing, the battery tray being capable of moving longitudinally inside the housing and to a position external to the housing.

40. A flashlight, comprising:

a light source;

a housing;

5 at least two battery locations internal to the housing for the positioning of at least two batteries, each of the battery locations being capable of accommodating one of the at least two batteries, one of the at least two batteries being one of at least two distinct sizes; and

10 a means for preventing a closing of an electrical circuit that electrically couples the at least two batteries to the light source when a first of the at least two batteries and a second of the at least two batteries are of distinct sizes.

41. The flashlight of claim 40, further comprising:

a means for applying a force to the at least two batteries in the at least two battery locations to maintain the batteries in a seating position.

42. A flashlight, comprising:

a light source;

a housing;

at least two battery locations internal to the housing for the positioning

5 of at least two batteries, each of the battery locations being capable of
accommodating one of the at least two batteries, one of the at least two
batteries being one of at least two distinct sizes;

at least two conductive leaf springs, each of the at least two
conductive leaf springs being associated with a respective one of the battery
10 locations, wherein an apex of each of the at least two conductive leaf
springs projects into the respective one of the battery locations, wherein one
of the conductive leaf springs is coupled to a first battery contact, and a
second one of the conductive leaf springs is electrically coupled to the light
source; and

15 at least two bridge conductors, each of the bridge conductors having
a pair of bridge contacts, wherein one of the bridge conductors electrically
couples a first one of the conductive leaf springs with a second one of the
conductive leaf springs if an apex of each of the conductive leaf springs is
displaced by one of the at least two batteries, and the at least two batteries
20 are of the same size, thereby prevents a closing of an electrical circuit that
electrically couples the at least two batteries to the light source when a first
of the at least two batteries and a second of the at least two batteries are of
distinct sizes.